PRODUCT DATA

PULSE™ Material Testing — Type 7758

PULSE™ Material Testing is a complete and fully integrated system for making acoustic measurements on small material samples in the 50 Hz to 6.4 kHz frequency range. The system consists of PULSE™ Material Testing Program Type 7758, Two-microphone Impedance Measurement Tube Type 4206 or Impedance Measurement Tube for ASTM Type 4206 A, Power Amplifier Type 2716 C and PULSE™, the Multi-analyzer System Type 3560.

USES

❍ Measurement of:
  – acoustic absorption coefficient
  – acoustic reflection coefficient
  – normalized impedance
  – normalized admittance
❍ Measurements on complex or composite materials
❍ Measurements on orientation-sensitive materials
❍ Simulation of measurements on hanging ceilings

BENEFITS

❍ Microsoft® Windows®-based PULSE™ platform ensures speed and exceptional accuracy
❍ Intuitive, task-oriented user-interface simplifies the entire measurement process from setup to documentation of final results
❍ Seamless combination of measurements made with various tubes allows use of a large frequency range (50 Hz to 6.4 kHz)
❍ Averaging of results from different measurements allows compensation for sample variations and simulation of composite materials
❍ Batch support ensures easy setup and execution of groups of measurements
❍ Extraction of 1/n-octave centre frequency information enables comparison with data obtained using the standing wave ratio method
❍ Integration with Microsoft® Word and Excel supports fast, automated reporting and advanced post-processing
❍ On-line, context-sensitive help ensures quick mastery of the software
❍ Support of custom measurement tubes or tubes from other vendors allows use of existing equipment

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The Growing Importance of Acoustic Material Testing

With today's growing focus on noise control issues – and the emergence of sound quality as an important aspect of product design – acoustic material testing is becoming increasingly relevant to engineers, designers and manufacturers from a broad range of industries.

The PULSE™ Material Testing system contains everything you need to measure the acoustic properties of virtually any material, quickly and accurately.

Brüel & Kjær

# A Versatile and Modern Material Testing System

The PULSE™ Material Testing system can be used to measure the acoustic properties of almost any test sample, including composite and irregular materials such as ceiling tiles and fissured, acoustic tiles. The backplate of the Type 4206 measurement tube can be withdrawn to produce an air gap behind the sample – a useful feature, for example, for simulating a hanging ceiling. In addition, the tube can be mounted vertically to make measurements on sand, liquids and other orientation-sensitive materials that cannot be mounted in the tube as samples.

The system is based on the two-microphone, transfer-function test method, which means that measurements take only a fraction of the time required by traditional, standing-wave, ratio systems. Using two fixed microphones, the test system makes simultaneous measurements at all frequencies of interest.

PULSE™ Material Testing Type 7758 works in conjunction with PULSE™, the multi-analyzer system and Two-microphone Impedance Measurement Tube Type 4206 or Impedance Measurement Tube for ASTM Type 4206 A (see the separate Product Data, BP 1039). As a result, all the benefits of the PULSE™ platform are available, including advanced features for calibration, measurement, display and reporting, the PULSE™ task-oriented user-interface, and extreme accuracy.

The PULSE™ Material Testing Program Type 7758

Fig. 1
The PULSE™ Material Testing Program's task-oriented user interface provides step-by-step guidance through all stages of the measurement process
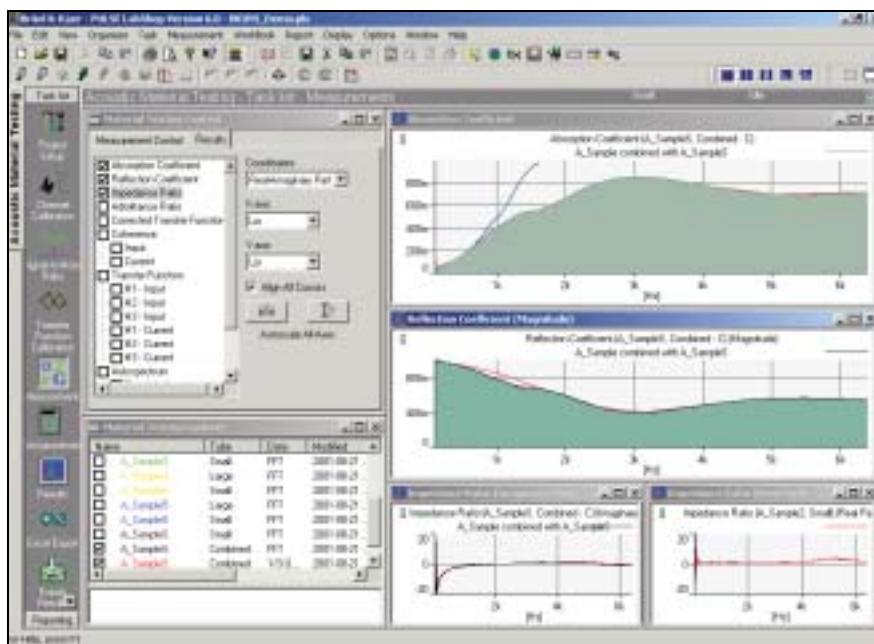
Making a Complex Process Simple

The PULSE™ Material Testing Program features an effective, task-oriented user-interface that transforms even the most complex test situations into straightforward, intuitive processes. Each test session is defined within the program as a "project" that contains all relevant settings and a set of tasks corresponding to the actual stages of the test. Tasks are listed in the display as icons that open user-defined screen layouts with task-dedicated control windows and displays.

The advantage of this task-oriented approach to session management is that, once a project is defined, the actual test process is a simple matter of working your way down through the task list. As you click your way through the tasks, the program opens the appropriate screen layouts, leading you through all stages of the test in a simple and logical way.

The PULSE™ Material Testing Program is delivered with predefined projects for handling typical material testing situations. These provide a convenient starting point for creating user-defined projects. Tasks can be added, deleted, rearranged and modified freely within projects to suit your actual test situation.

Powerful Predefined Tasks

The PULSE™ Material Testing Program comes with the following predefined tasks:

Fig. 2
The Project Setup task is used to define the overall test process (equipment specification, parameters, PULSE™ hardware configuration, etc.)
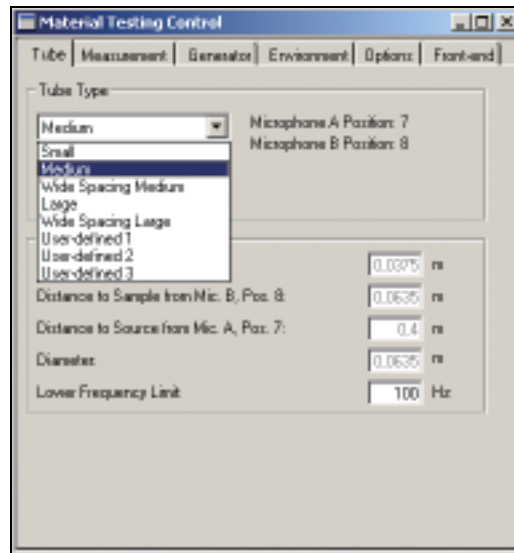
Project Setup
This is where all general parameters for a test are defined, including selection of the type of tube to be used. In addition, the task contains various measurement and generator parameters, plus environmental settings and the PULSE™ hardware configuration. There are also a number of options for customising the test. For example, you can select your preferred units for various parameters and specify settings for the program's automatic warning functions.

Channel Calibration
The Channel Calibration task facilitates fast and simple calibration of the individual measurement channels. Because the PULSE™ Material Testing system uses the two-microphone test method, this calibration step is not strictly necessary to obtain accurate final results. However, channel calibration improves the accuracy of intermediate results, which can be used to validate measurements. Another benefit of the calibration task is easy importation of calibration data from one project to another, eliminating the need to re-calibrate between tests.

The Channel Calibration task illustrates the convenience of the flexible task-oriented user interface. If you don't need to do a channel calibration, you can simply delete it from the task list or move it to a secondary group of tasks that are only performed occasionally.

Signal-to-Noise Ratio
This task streamlines the process of determining the signal-to-noise ratio (SNR) at each microphone position prior to testing, which is necessary to ensure accurate results. The task automatically compares the measured SNR values to a user-defined threshold and, if this is exceeded, issues a warning. You can also set up the task to save the background noise. This will be used to automatically calculate the SNR when subsequent measurements are made in the Measurements task (described below).
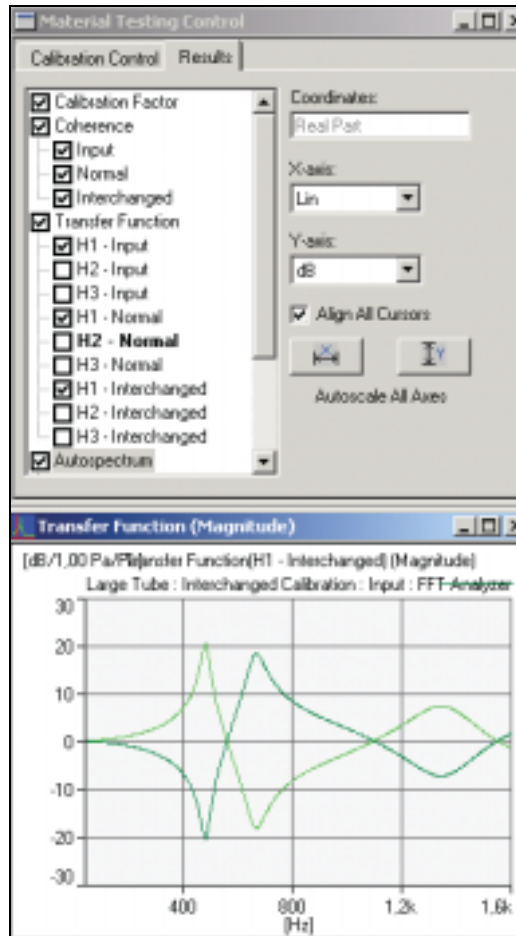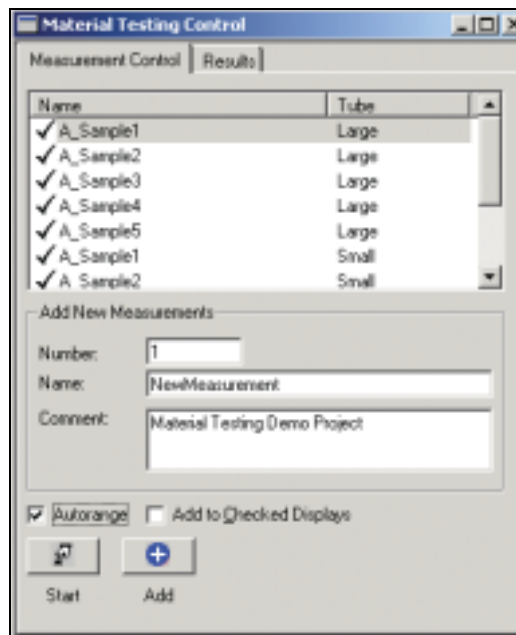
Transfer Function Calibration

When using the two-microphone method, it is essential to perform a transfer function calibration to eliminate the possibility of phase and amplitude mismatches between the two measurement channels. The Transfer Function Calibration task contains a fast and easy procedure for calculating a calibration factor that is valid for all successive measurements.
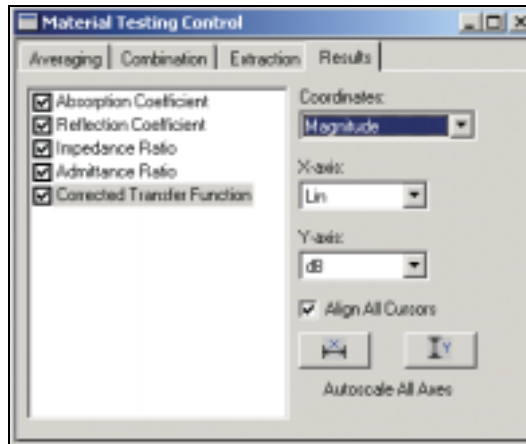
Measurements

The Measurements task provides all the basic functions you need to make measurements and examine results, plus several convenient extra features. For example, the task includes a powerful batch measurement facility that allows you to configure up to 250 items prior to measurement. This offers not only an organised and systematic way to make multiple measurements, but it also allows work to be allocated economically within an organisation. It is possible, for example, to assign a test engineer to set up a batch session, and then have a test operator or other less specialised staff member perform the actual tests.

Another valuable feature of the Measurements task is the ability to monitor the real-time progress of intermediate and final results during measurement. The task includes a host of functions for examining intermediate results, which enables you to validate your data thoroughly before accepting it. In addition, the program issues automatic warnings during measurement if parameter levels fall out of compliance with predefined settings. As a typical example, the Measurements task can be set up to notify you if there is too large a difference between the maximum and minimum sound pressure level inside the tube.

The Measurements task also supports the display of previously measured and calculated results, even allowing you to view them simultaneously with data from the current measurement.
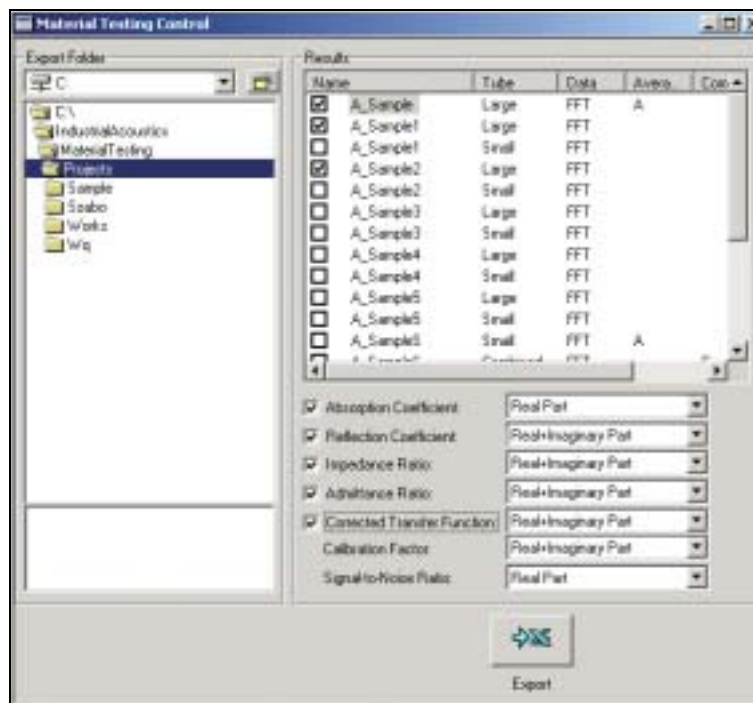
Post-processing

Once you've made your basic measurements, the Post-processing task simplifies the work of extracting additional information from your data. For example, you might want to average several measurements together. This enables you to compensate for variations in the test samples, or simulate the characteristics of composite materials. You can also combine measurements from different tube types to cover a broader frequency range. In addition, the Post-processing task can extract 1/n-octave frequency information, allowing comparison of current results with data obtained using the standing wave ratio method.

Excel Export

This task supports trouble-free export of data to Microsoft® Excel for further post-processing or generation of dedicated reports. All you do is select the measurements/results desired and click on the **Export** button. PULSE™ Material Testing automatically opens Excel and transfers the data to the appropriate sheets.
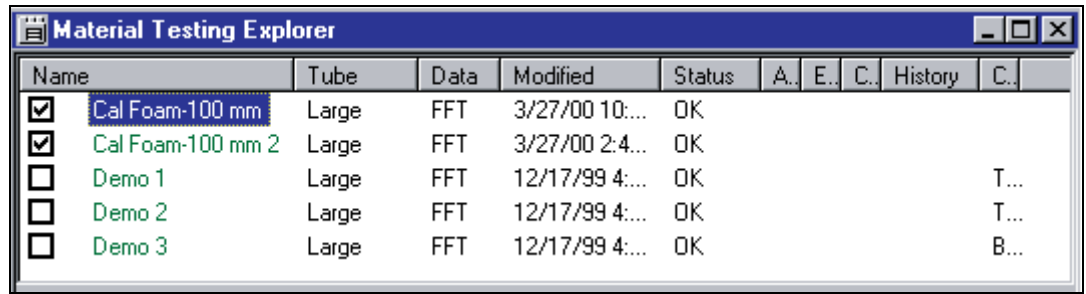
Export and Import of Results

Measured data and calculated results are generally saved in the project in which they were originally generated. However, the Export/Import Results task lets you save data in dedicated files and load it into another project in the PULSE™ Material Testing Program. This ability to compare data from different projects is particularly useful in situations that call for repetition of measurements over time. For example, you might use the export/import feature to investigate design advances in a material from one generation to the next, or to monitor the manufacturing quality of material samples from different production batches.

Word Reporting

The PULSE™ built-in report generator provides fast and standardised documentation in Microsoft® Word. For example, you can load a selected report setup into a Microsoft® Word template that can be edited to include company details, logos and any other desired information. The final report is generated automatically, but it can be edited freely just like any other Microsoft® Word document.

Systematic Data Management with the Material Testing Explorer

Name	Tube	Data	Modified	Status	A.	E.	C.	History	C.
☑ Cal Foam-100 mm	Large	FFT	3/27/00 10:...	OK					
☑ Cal Foam-100 mm 2	Large	FFT	3/27/00 2:4...	OK					
☐ Demo 1	Large	FFT	12/17/99 4:...	OK					T...
☐ Demo 2	Large	FFT	12/17/99 4:...	OK					T...
☐ Demo 3	Large	FFT	12/17/99 4:...	OK					B...

The Material Testing Explorer is a convenient tool for keeping track of measurement data. All measurements that have been executed, post-processed or imported are displayed in an easy-to-read table format. The Explorer also lists a number of attributes for each measurement including the name, a comment, the type of tube used and a specification of the post-processing performed. The table can be sorted according to the various attributes for easy location of specific measurements. In addition, you can "hide" any number of attributes and freely change the order in which they are displayed.

The Explorer works in conjunction with all of the program tasks and takes on additional functionality in several contexts. For example, when you're working with the Measurements task, you use the Explorer to select the measurements for which you want to display results. In the Microsoft® Excel Export task, the Explorer provides a fast and simple means of selecting measurements for export.

On-line, Context-sensitive Help

The PULSE™ Material Testing Program Type 7758 features an extensive on-line help facility, including a description of the two-microphone method, and a reference to the applicable standards. In addition, the software provides context-sensitive help for each program task.

As an added help, the software package is delivered with a set of templates.

Specifications – PULSE™ Material Testing Program Type 7758

Type 7758 is a software application for use with PULSE™, the Multi-analyzer System Type 3560[1]

SYSTEM REQUIREMENTS
- The PC requirements for PULSE™, the Multi-analyzer System Type 3560 must be fulfilled (see the System Data BU 0229)
- Noise and Vibration Analysis Type 7700 G or FFT Analysis Type 7770 G must be installed

APPLICATION PROJECTS
Type 7758 includes a number of predefined application projects for material testing

MEASUREMENT
Measurements are based on the two-microphone transfer-function method as described in the ISO 10534–2 and ASTM 1050–98 standards. A group or batch of measurements can be made in a project and measurements from previous projects can be imported into the current project

Measurement Tubes
Type 7758 supports all tube setups included in the Type 4206 and 4206 A Impedance Measurement Tubes and up to three user-defined tube setups in a single project

Batch Specifications
Number of Batch Items: 1 to 250

FFT Analysis
Measurements in Type 7758 are based on FFT analysis

Parameters
Baseband and Zoom:	50 – 6400 lines
Frequency Span:	1.56 Hz – 25.6 kHz (tube dependent)
Centre Frequency Resolution:	1 mHz
Averaging Mode:	Linear
Number of Averages:	1 – 100000

Signal Generation
Waveforms:	Random and Pseudo-Random

POST-PROCESSING
Individual measurements can be post-processed as follows:
- Averaging of multiple individual results

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1) For PULSE™ specifications, see System Data BU 0229 (software) and System Data BU 0228 (hardware)

- Combining of measurements from two different tubes
- Extraction of 1/n-octave centre frequency information

Post-processing can be performed on the following results:
- Absorption Coefficient
- Reflection Coefficient
- Normalized Impedance
- Normalized Admittance

RESULTS
Type 7758 offers a large number of task-dependent intermediate and final result types

Channel Calibration
Sound Pressure Level at each microphone position

Signal-to-Noise Ratio
Signal-to-Noise Ratio (SNR) at each microphone position
- As measured
- User-defined SNR threshold level

Sound Pressure Level at each microphone position
- With Generator off (background noise)
- With Generator on

Transfer Function Calibration
- Calibrator Factor
- Coherence
- Transfer Function H1, H2 and H3
- Sound Pressure Level at each microphone position

Measurements
- Absorption Coefficient
- Reflection Coefficient
- Normalized Impedance Ratio
- Normalized Admittance Ratio
- Coherence
- Corrected Transfer Function
- Transfer Function
- Sound Pressure Level at each microphone position

REPORTING
- Integrated reporting with Microsoft® Word
- Automated export of Data to Microsoft® Excel

PROCESSING REQUIREMENTS
The processing requirements correspond to those of PULSE™, the Multi-analyzer system, Type 3560

Ordering Information – PULSE™ Material Testing System

PULSE™ Material Testing System[1]

BZ 5217	PULSE™ LabShop CD-ROM
Type 7758	PULSE™ Material Testing Program license
Type 7700G	Noise and Vibration Analysis
or	
Type 7770 G	FFT Analysis
7700G–MS1	Software Maintenance and Upgrade Agreement
or	
7770 G–MS1	Software Maintenance and Upgrade Agreement
Type 2827	Portable Data Acquisition Unit
Type 7533	LAN Interface Module
Type 3109	Generator, 4/2-ch. Input/Output Module

Required Accessories

BZ 5372 – xx[2]	Microsoft® Windows® 2000 without manuals
BZ 5373 – xx[2]	Microsoft® Windows® 2000 with manuals
UL 0208 – xx[2]	Microsoft® Office XP Small Business Edition
UL 0209 – xx[2]	Microsoft® Office XP Standard edition with manuals
UL 0207 – xx[2]	Microsoft® Office XP Professional Edition

Optional Accessories

Type 2716 C[3]	Power Amplifier (includes input and output cables WL 1324 and WL 1325)
Type 2718[3]	Power Amplifier
Type 4206[4]	Two-microphone Impedance Measurement Tube
Type 4206 A[4]	Impedance Measurement Tube for ASTM
Type 4231	Sound Level Calibrator
DP 0775	Adaptor for $1/4''$ Microphones (for Type 4231)

2)xx specifies country: GB, DE, FR, ES, IT, SE
3)Type 2716 C is recommended
4)For a complete specification of the Impedance Measurement Tubes, see Product Data BP 1039

1) For Portable PULSE™ specifications, see System Data BU 0229 (software) and System Data BU 0228 (hardware)

TRADEMARKS
PULSE is a trademark of Brüel & Kjær Sound and Vibration Measurement A/S
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Brüel & Kjær reserves the right to change specifications and accessories without notice.

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